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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/812,839	03/30/2004	Lalit M. Bharadwaj	U 015121-7	3629
140 7590 10/01/2008				
LADAS & PARRY LLP 26 WEST 61ST STREET NEW YORK, NY 10023				
EXAMINER				
LIN, JERRY				
ART UNIT		PAPER NUMBER		
1631				
MAIL DATE		DELIVERY MODE		
10/01/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary**Application No.**

10/812,839

Applicant(s)

BHARADWAJ ET AL.

Examiner

JERRY LIN

Art Unit

1631

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4, 5, 11, 13, 17 and 22-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 22-29 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4, 5, 11, 13, 17, 30, 31, 33 and 36 is/are rejected.
- 7) ☒ Claim(s) 32, 34 and 35 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 6/30/08
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 23, 2008 has been entered.

Status of the Claims

Claims 1, 2, 4, 5, 11, 13, 17, 22-36 are under examination.

Claims 3, 6-10, 12, 14-16, 18, 20, and 21 are cancelled.

Claim 19 is withdrawn as being drawn to a non-elected group.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 2, 4, 5, 11, 13, 17, 30, 31, 33, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bancroft et al. (US 6,312,911) in view of Ackley (US 6,422,476).

The instant claims are drawn to a method of encoding information in DNA by producing a synthetic DNA molecule with encrypted information that can be decoded with an encryption key, where the molecule is flanked on each side by a primer sequence, and storing the DNA molecule with a storage DNA.

Regarding claims 1, 5, 26, 30, 33 and 36, Bancroft et al. teach a method that includes providing an encryption key (Figure 1B); producing a synthetic DNA molecule with encrypted information that can be decoded with an encryption key, where the molecule is flanked on each side by a primer sequence (column 2, lines 34-54; column 4, lines 55-67); and storing the DNA molecule with storage DNA (column 2, lines 34-54),

and producing a plurality of synthetic DNA molecules that each encode a different portion of the message (column 4, lines 45-54; column 6, lines 30-42).

Although, Bancroft et al. teaches using all four nucleotides in three base codes to represent ASCII characters (column 4, lines 55-67), Bancroft et al. do not explicitly teach providing an encryption key where each character of an extended ASCII character is represented by a DNA code of four bases.

Also regarding claims 1, 5, 30, 33, and 36, Ackley teaches that using a longer code allows a user to represent more characters with a code (columns 1 and 2). Thus, one of ordinary skill in the art would increase the number of nucleotides in a base code to gain the capability to represent more characters in the method taught by Bancroft et al.

Regarding claims 2 and 4, Bancroft et al. teach where the storage DNA is human DNA (column 3, lines 4-17) and where the storage DNA is synthetic (column 5, lines 1-30).

Regarding claim 11, Bancroft et al. teach where plain text is encrypted in terms of DNA sequences using encryption key software (column 11, lines 24-46).

Regarding claim 12, Bancroft et al. teach where the encoded data is expressed in different fragments of DNA (column 4, lines 45-54; column 6, lines 30-42).

Regarding claim 13, Bancroft et al. teach using a DNA synthesizer (column 4, line 55- column 5, line 30).

Regarding claim 17, Bancroft et al. teach where the DNA is mixed with complex denatured DNA strands of human genomic DNA (column 2, lines 34-54; column 4, lines 1-14).

Regarding claims 18, and 31, Bancroft et al. teach extracting the message (column 5, lines 35-54); using PCR to isolate and amplify the encrypted DNA strand (column 5, lines 35-54); sequencing the DNA strand (column 5, lines 35-54); and converting the DNA sequence using the encryption/decryption key (column 2, lines 34-54).

It would have been obvious to one of ordinary skill in the art at the time of the invention to increase the number of nucleotides in the DNA codes taught by Bancroft et al. in order to represent more characters in the extended ASCII character set. Bancroft et al. teaches that DNA codes may be used to represent ASCII characters. However, Bancroft et al. does not teach the technique of apply further nucleotides in order to increase the number of characters the DNA codes may represent. Ackley teaches that increasing the size of the code also increases the number of characters the code may represent. Thus, it would have been obvious to one of ordinary skill in the art to apply the technique of increasing the size of a code as taught by Ackley, to improve the method of Bancroft et al. for the predictable results of enabling the code to represent more characters of the extended ASCII character set.

Response to Arguments

4. Applicants have responded to this rejection by stating Bancroft et al. do not disclose or teach the encryption of 256 standard ASCII characters and is limited to alpha numerals and cannot represent digital documents. The Examiner agrees that Bancroft et al. do not teach the encryption of 256 standard ASCII characters. However, the combination of Bancroft et al. and Ackley makes the encryption of 256 standard ASCII characters obvious. Bancroft et al. teach using DNA bases to encode for characters. Ackley teaches that longer codes allow a user to represent more characters with that code. Thus one of ordinary skill in the art could increase the code of Bancroft et al. by one base to increase the number of characters Bancroft et al. may represent using the reasoning of Ackley.

Applicants also state that Ackley does not provide a motivation to combine the references and especially since DNA bases are naturally read in triplets. First, KSR forecloses the argument that a specific teaching, suggestion, or motivation is required to support a finding of obviousness. (*Ex Parte Smith*, –USPQ2d–, slip op. at 20). Secondly, DNA bases are read in triplets if they are understood to encode for amino acids. However, in the instant case, the DNA sequence is treated as a code for data, which may not naturally lend to reading the DNA sequence in triplets.

Applicants also state that Bancroft et al. and Smith et al. are not able to encode for digital information or documents. However, the instant claims do not necessarily require that the encoded information be digital. Because this limitation is not in the claims, it cannot be used to distinguish the claims from the prior art.

Applicants also state that neither Bancroft et al. nor Ackley teach where a plurality of DNA molecules encodes a different portion of the message as required in claim 22. The Examiner agrees, and the rejection has been withdrawn as it applies to claim 22 and its dependent claims.

Withdrawn Rejections

5. Applicant's arguments, filed June 23, 2008, with respect to the rejection made under 35 U.S.C. §112 2nd paragraph and the rejection of 35 U.S.C. §103 as applied to claims 22, 26, 27, and 29 have been fully considered and are persuasive. The amendments were sufficient to overcome the rejection made under 35 U.S.C. §112 2nd paragraph. Furthermore, Ackley and Bancroft et al. do not teach or suggest a plurality of DNA molecules that each encode a different part of a message as recited in claim 22 and dependent claims 26, 27 and 29. These rejections have been withdrawn.

Allowable Subject Matter

6. Claims 22-29 are allowed.

Claims 32, 34, and 35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JERRY LIN whose telephone number is (571)272-2561. The examiner can normally be reached on 7:00-5:30pm, M-TH.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie A. Moran can be reached on (571) 272-0720. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jerry Lin/
Examiner, Art Unit 1631
9/26/08